Claims

[c1] 1.A method for manufacturing an article, comprising:
disposing a managed heat transfer layer in operable communication with a second surface of a stamper, wherein a first surface of said stamper comprises surface features, wherein an exposed surface of said managed heat transfer layer has been altered by a method selected from the group consisting of chemically, mechanically, or a combination thereof;
disposing the stamper in a mold with at least a portion of said exposed surface disposed in operable communication with a mold half;
injecting a molten plastic into said mold;
cooling the plastic to form said data storage media; and
releasing said data storage media from said mold.

[c2] 2.The method of Claim 1, further comprising forming a thickness of said managed heat transfer layer having a variation of less than about 5%.

[c3] 3.The method of Claim 2, wherein forming said substantially uniform thickness further comprises surface lapping said exposed surface.

[c4] 4.The method of Claim 3, wherein said thickness varies less than about 3%.

[c5] 5.The method of Claim 4, wherein said thickness varies less than about 1%.

[c6] 6.The method of Claim 5, wherein said thickness varies less than about 0.5%.

[c7] 7.The method of claim 2, wherein said lapping further comprises grinding with sand paper having a grit particle size of less than or equal to about 9 micrometers.

[c8] 8.The method of Claim 1, wherein said chemically altered exposed surface comprises a polymer chain length shorter than a non-chemically altered portion said managed heat transfer layer.

[c9] 9.The method of Claim 1, wherein said managed heat transfer layer comprises a material selected from the group consisting of thermoset materials, plastics, porous metals, ceramics, low-conductivity metal alloys,

and cermets, composites, reaction products, and combinations comprising at least one of the foregoing materials.

[c10] 10.The method of Claim 9, wherein said material is selected from the group consisting of polyimides, polyamideimides, polyamides, polysulfone, polyethersulfone, polytetrafluoroethylene, polyetherketone, and composites, reaction products, and combinations comprising at least one of the foregoing materials.

[c11] 11.The method of Claim 1, wherein said managed heat transfer layer further comprises a lubricant component either incorporated into the managed heat transfer layer or placed on its surface.

[c12] 12.The method of Claim 11, wherein lubricant is selected from the group consisting of molybdenum disulfide (MoS_2), graphite fluoride $(CF_{1.1})_n$, and reaction products and combinations comprising at least one of the foregoing lubricants.

[c13] 13.The method of Claim 11, wherein said managed heat transfer layer comprises about 5 wt% to about 60 wt% of said lubricant, based upon the total weight of the managed heat transfer layer.

[c14] 14.The method of Claim 13, wherein said managed heat transfer layer comprises about 5 wt% to about 50 wt% of said lubricant, based upon the total weight of the managed heat transfer layer.

[c15] 15.The method of Claim 14, wherein said managed heat transfer layer comprises about 10 wt% to about 40 wt% of said lubricant, based upon the total weight of the managed heat transfer layer.

[c16] 16.The method of Claim 11, wherein said lubricant is in the form of a layer disposed on said exposed surface.

[c17] 17.The method of Claim 16, wherein said lubricant layer has a thickness of less than or equal to about 1 micrometer.

[c18] 18.The method of Claim 17, wherein said thickness is about 0.01 micrometers to about 0.10 micrometers.

[c19] 19.The method of Claim 1, wherein said exposed surface further comprises an area of roughness where said exposed surface operably communicates with said mold, wherein said roughness is less than or equal to about 0.50 micrometers, as measured from a plane of said managed heat transfer surface.

[c20] 20.The method of Claim 19, wherein said roughness is about 0.20 micrometers to about 0.40 micrometers.

[c21] 21.The method of Claim 20, wherein said roughness is about 0.25 micrometers to about 0.30 micrometers.

[c22] 22.The method of Claim 1, wherein a coefficient of friction of greater than or equal to about 0.50 exists in an area of physical contact between said managed heat transfer layer and said support.

[c23] 23.The method of Claim 1, wherein said article is a data storage media.

[c24] 24.A molding apparatus for producing a data storage media comprising:
a stamper comprising a managed heat transfer layer, wherein a first surface of said stamper comprises surface features, and wherein an exposed surface of said managed heat transfer layer has been altered by a method selected from the group consisting of chemically, mechanically, or a combination thereof, and has a thickness variation of less than about 5%; and
a support for receiving the stamper by operable communication with said managed heat transfer layer.

[c25] 25.The molding apparatus of Claim 24, wherein said managed heat transfer layer comprises a material selected from the group consisting of thermoset materials, plastics, porous metals, ceramics, low-conductivity metal alloys, and cermets, composites, reaction products, and combinations comprising at least one of the foregoing materials.

[c26] 26.The molding apparatus of Claim 25, wherein said material is selected from the group consisting of polyimides, polyamideimides, polyamides, polysulfone, polyethersulfone, polytetrafluoroethylene, polyetherketone, and composites, reaction products, and combinations comprising at least one of the foregoing materials.

[c27] 27.The molding apparatus of Claim 24, wherein said managed heat transfer layer further comprises a lubricant.

[c28] 28.The molding apparatus of Claim 27, wherein lubricant is selected from the group consisting of molybdenum disulfide (MoS_2), graphite fluoride $(CF_{1.1})_n$, and reaction products and combinations comprising at least one of the foregoing lubricants.

[c29] 29.The molding apparatus of Claim 27, wherein said managed heat transfer layer comprises about 5 wt% to about 60 wt% of said lubricant based upon the total weight of the managed heat transfer layer.

[c30] 30.The molding apparatus of Claim 29, wherein said managed heat transfer layer comprises about 5 wt% to about 50 wt% of said lubricant based upon the total weight of the managed heat transfer layer.

[c31] 31.The molding apparatus of Claim 30, wherein said managed heat transfer layer comprises about 10 wt% to about 40 wt% of said lubricant based upon the total weight of the managed heat transfer layer.

[c32] 32.The molding apparatus of Claim 31, wherein said lubricant is in the form of a layer disposed on said exposed surface.

[c33] 33.The molding apparatus of Claim 32, wherein said lubricant layer has a thickness of less than or equal to about 1 micrometer.

[c34] 34.The molding apparatus of Claim 33, wherein said thickness is about 0.01 micrometers to about 0.10 micrometers.

[c35] 35.The molding apparatus of Claim 24, wherein said exposed surface further

comprises an area of roughness where said exposed surface operably communicates with said mold, wherein said roughness is less than or equal to about 0.50 micrometers as measured from a plane of said managed heat transfer surface.

[c36] 36.The molding apparatus of Claim 35, wherein said roughness is about 0.20 micrometers to about 0.40 micrometers.

[c37] 37.The molding apparatus of Claim 36, wherein said roughness is about 0.25 micrometers to about 0.30 micrometers.

[c38] 38.The molding apparatus of Claim 24, further comprising a coefficient of friction of greater than or equal to about 0.50 in an area of physical contact between said managed heat transfer layer and said support.

[c39] 39.A method for producing a stamper, comprising:
forming a nickel plated substrate having desired surface features on one side;
disposing a managed heat transfer layer on a second side of said substrate;
forming a thickness of said managed heat transfer layer having a variation of less than about 5%; and
altering an exposed surface of said managed heat transfer layer, wherein said altering is by a method selected from the group consisting of chemically altering, mechanically altering, or a combination thereof.

[c40] 40.The method of Claim 39, wherein said chemically altering said exposed surface further comprises reactive ion etching with a selected from the group consisting of oxygen, chlorine, hydrochloric acid, fluorocarbons, nitrogen, nitrogen oxides, argon, boron trichloride, hydrogen, sulfur hexafluoride, and ions, reaction products, and combinations comprising at least one of the foregoing gases.

[c41] 41.The method of Claim 39, wherein chemically altering said exposed surface further comprises exposing said exposed surface to an aqueous caustic solution.

[c42] 42.The method as in Claim 41, wherein said aqueous caustic solution comprises potassium hydroxide.

[c43] 43.The method of Claim 39, wherein forming said thickness further comprises surface lapping said exposed surface.

[c44] 44.The method of Claim 43, wherein said thickness varies less than about 3%.

[c45] 45.The method of Claim 44, wherein said thickness varies less than about 1%.

[c46] 46.The method of Claim 45, wherein said thickness varies less than about 0.5%.

[c47] 47.The method of Claim 43, wherein said lapping further comprises grinding with sand paper having a particle size of less than or equal to about 5 micrometers.

[c48] 48.The method of Claim 40, wherein chemically altering said exposed surface further comprises shortening a polymer chain length of plastic disposed at said exposed surface.

[c49] 49.The method of Claim 39, wherein said managed heat transfer layer comprises a material selected from the group consisting of thermoset materials, plastics, porous metals, ceramics, low-conductivity metal alloys, and cermets, composites, reaction products, and combinations comprising at least one of the foregoing materials.

[c50] 50.The method of Claim 49, wherein said material is selected from the group consisting of polyimides, polyamideimides, polyamides, polysulfone, polyethersulfone, polytetrafluoroethylene, polyetherketone, and composites, reaction products, and combinations comprising at least one of the foregoing materials.

[c51] 51.The method of Claim 39, wherein said managed heat transfer layer

further comprises a lubricant.

[c52] 52.The method of Claim 49, wherein lubricant is selected from the group consisting of molybdenum disulfide (MoS_2), graphite fluoride $(CF_{1.1})_n$, and reaction products and combinations comprising at least one of the foregoing lubricants.

[c53] 53.The method of Claim 49, wherein said managed heat transfer layer comprises about 5 wt% to about 60 wt% of said lubricant based upon the total weight of the managed heat transfer layer.

[c54] 54.The method of Claim 53, wherein said managed heat transfer layer comprises about 5 wt% to about 50 wt% of said lubricant based upon the total weight of the managed heat transfer layer.

[c55] 55.The method of Claim 54, wherein said managed heat transfer layer comprises about 10 wt% to about 40 wt% of said lubricant based upon the total weight of the managed heat transfer layer.

[c56] 56.The method of Claim 39, further comprising forming a lubricant layer on said exposed surface.

[c57] 57.The method of Claim 56, wherein said lubricant layer has a thickness of less than or equal to 1 micrometer.

[c58] 58.The method of Claim 57, wherein said thickness is about 0.01 micrometer to about 0.10 micrometer.

[c59] 59.The method of Claim 39, wherein said exposed surface further comprises an area of roughness where said exposed surface operably communicates with said mold, wherein said roughness is less than or equal to about 0.50 micrometers, as measured from a plane of said managed heat transfer surface.

[c60] 60.The method of Claim 59, wherein said roughness is about 0.20 micrometers to about 0.40 micrometers.

[c61] 61.The method of Claim 60, wherein said roughness is about 0.25 micrometers to about 0.30 micrometers.